Tree survey at the mitigation billabong at the Olentangy River Wetland Research Park in August 2002

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Introduction

In the six years since it was constructed, several definitive vegetation zones have developed in the billabong. The development of woody vegetation has occurred primarily along the perimeter of the wetland on the slopes of the basin. The wetland transitional zone of the billabong (approximately 0.6-1.0 m above the wetland bottom, Figure 1) has developed the most diverse plant assemblage (Anderson et al. 2003), including potential future canopy tree species. This zone of the billabong receives sporadic inundation during high water events when the Olentangy River overflows into the billabong. These high water events usually occur during the winter-spring wet season (December – May) and result in short term inundation. However, inundation is long enough to influence species composition including wetland pioneer species, particularly cottonwood (*Populus deltoides* Marsh.). A survey was conducted in August 2002 to determine the distribution and abundance of tree species within the wetland transitional zone of the billabong wetland. This survey represents a summary of the natural colonization of trees 6 years after the wetland was created. This survey was also done in the year prior to a major tree planting done around the perimeter of the billabong in April 2003.

Methods

Site description

In May 1997, plants were installed throughout the wetland. The only woody vegetation planted in the billabong in 1997 was *Cephalanthus occidentalis* L. Herbaceous vegetation was planted in the billabong and native prairie grasses and plant seeds were broadcasted throughout the adjacent upland zones of the excavated basin area (Mitsch et al., 1998).

Tree and shrub diversity

A tree and shrub survey of the wetland transitional zone of the wetland was conducted on 14 August 2002 (Figure 1). The outer edge of the wetland transitional zone was easily identified by a distinct vegetative edge that was comprised by several facultative wetland plants, including *P. deltoides*. A 4 m x 2 m sampling plot was used every 20 m along a transect that extended along the outer 2 m of the wetland transitional zone. The transect excluded approximately 150 m of wetland edge at the west side of the billabong (Figure 1).

As a result of this methodology, a total of 868 m of transect was covered and a total of 37 plots were sampled. For each sampling plot, the four corners were temporarily marked and all tree and shrub specimens within were identified and counted. Because of some difficulty distinguishing *Salix* seedlings, all willow species excluding *Salix nigra* were categorized as *Salix* spp.

Results and Discussion

A total of 830 trees/shrubs of 11 different species were counted in the billabong during the survey (Table 1). Trees identified included: *Plantanus occidentalis* L., *Populus deltoides* Marsh., *Acer negundo* L., *Acer rubrum* L., *Salix nigra* Marsh., *Salix alba* L., *Salix exigua* Nutt., *Cephalanthus occidentalis* L., *Ulmus americana* L. and *Celtis occidentalis* L. Based on the results of this survey, a Shannon-Wiener Index and Simpson's Index were calculated for this zone of the billabong (Table 2).

Of the 830 trees counted, a total of 726 were *P. deltoides* (Table 1) which has become very common along the slopes leading down to the billabong. *P. deltoides* is a prolific seed producer and becomes established in areas that are only seasonally flooded. Mature specimens which serve as as a seed source for recruitment are common in the bottomland hardwood forest adjacent to the wetland (Dudek et al., 1996, 1998). Other trees identified in this survey were in greater abundance in other zones of the billabong. For example, a distinct zone of willows (*Salix* spp.) has formed at the bottom of the billabong slope in areas that experience longer inundation (Figure 1). A greater occurrence of *C. occidentalis* also occurred in the lower elevation zones of the billabong.

Using the mean abundance of trees in the plots surveyed, it was estimated that tree density in this portion of the billabong was 2.8 stems m-2. This is a high stem density but nearly all of the tree specimens counted in this survey were less than 1 m in height and most will not develop into mature specimens. The area of tree colonization in this part of the billabong will likely serve as a pioneer community in this zone over the next several years. The low species diversity suggested to us that a supplemental planting of hardwood trees should be part of the management of this wetland.

Figure 1. Dominant vegetation map of the ORWRP billabong wetland, July 2002. The billabong tree survey was conducted along the outer edge of wetland transitional edge zone.

Such a supplemental planting was indeed done to enhance this wetland in April 2003 and will be reported on in the 2003 Annual Report.

References

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Table 1. Number of trees/shrubs counted per m2 plot in the billabong at the Olentangy River Wetland Research Park in August 2002

	Tree Species								
Plot No.	*Plantanus occidentalis*	*Populus deltoides*	*Acer negundo*	*Acer rubrum*	*Salix* spp.	*Salix nigra*	*Cephalanthus occidentalis*	*Ulmus americana*	*Celtis occidentalis*
1		37							
2		28		1					
3		11							
4		13							
5		15			1	12			
6		25				1			
7		6							
8		16			1				
9		2							
10									
11	2	13			1	1	4		
12		6			2	2	2		
13						1			
14		34				3			
15		60			1				
16	1	25							
17		18				13			
18		25			2				
19		43				2			
20	1	25							
21		49							
22		39			3	2			
23	1	13				2			
24		25				6			
25		36							
26		19							
27		32							
28		23			2				
29		23	1						
30		6							
31	2	3	1					6	2
32		2	8			1		1	
33		3	7						
34				1					
35		18		1	2				
36		14			1				
37		19							
Total	7	726	17	3	16	46	6	7	2

Table 2. Tree diversity indice based on August 2002 billabong tree survey

Measure	Value
S (sp. richness)	9
D (Simpson's index)	0.7692
1-D (Simpson's index of diversity)	0.2308
1/D (Simpson's reciprocal index)	4.3323
H (Shannon-Wiener Index)	0.5842
E (evenness)	0.2659

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